Plant Pathology Circular No. 361
September/October 1993

Fla. Dept. Agric. & Consumer Services
Division of Plant Industry

Phytophthora Basal Canker of Red Maple[1]

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Red maple *(Acer rubrum* L.) is a relatively short-lived, medium-sized tree native to parts of southeastern Canada and nearly all of the eastern United States, including all but the extreme southern tip of peninsular Florida. While typically developing best in swampy or bottomland sites, red maple is adaptable and is often found growing on a wide variety of soil types and in a variety of soil drainage situations. In Florida and elsewhere, red maple is utilized extensively as an ornamental or shade tree species (Fowells 1965; Harlow and Harrar 1958).

Diseases of red maple in Florida are not especially significant, but in recent years one disease has caught our attention. This disease is a spectacular and readily recognized basal canker, from which *Phytophthora palmivora* (E. J. Butler) E. J. Butler has been isolated consistently.

Basal cankers of maples and other hardwoods are not novel phenomena. Large lesions developing at trunk bases and on adjacent portions of major roots, with names such as foot rots, collar rots, crown cankers or bleeding cankers, are known on a variety of hardwood species. Sinclair *et al.* (1987) list the following species of *Phytophthora* as causes of such diseases: P. *cactorum* (Lebert & Cohn) J. Schrot., *P. cambivora* (Petri) Buisman, *P. cinnamomi* Rands, *P. citricola* Sawada, *P. citrophthora* (R. E. Sm. & E. H. Sm.) Leonian, *P. cryptogea* Pethybr. & Lafferty, *P. drechsleri* Tucker, *P. megasperma* Drechs., *P. parasitica* Dastur, *P. syringae* (Kleb.) Kleb. *Phytophthora cactorum* has been reported as the cause of bleeding cankers of Norway maple *(A. platanoides L.),* sugar maple *(A. saccharum* Marsh.), black maple *(A. nigrum* Michx. f.), silver maple *(A. saccharinum L.),* sycamore maple *(A. pseudoplatanus L.),* and red maple in Tennessee, North Carolina, Virginia, and New England (Caroselli 1953; Caroselli and Howard 1939; Hepting 1971; Howard 1941; Stipes and Davis 1972; Toole 1951). It has also been tentatively identified in association with bleeding cankers of hardwoods in California (Miller 1941). According to Zabel *et al.* (1958), bleeding canker disease caused by P. *cactorum* was reported as the most serious disease of ornamental sugar maples in southeastern New Hampshire.

This circular represents 1) the first published description of basal cankers on maple in Florida, and 2) to our knowledge, the first reported association of *P. palmivora* and basal cankers on any hardwood species in the United States. To date, this disease has been confirmed on only four trees in Florida; one each in Ft. Myers, Naples, Orlando, and Ft. Lauderdale. All four trees were mature ornamentals. The pathogenicity of *P. palmivora* on red maple has been established in repeated greenhouse tests (Mitchell, ***unpublished).***

SYMPTOMS OF THE DISEASE: Infected trees exhibit a distinctive coffee-brown or dark rusty reddish-brown to black discoloration of the bark. Lesions advance rapidly upward from the groundline (several feet in a matter of weeks or months) and may progress well into the scaffold branches. Affected bark tissues secrete various quantities of light to dark reddish-brown exudate, especially at the advancing margins of the infection(s) (Fig. 1). Infected trees often remain green for months before eventually wilting and dying.

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INFECTION BIOLOGY: Little is known regarding the specific infection biology of this disease in Florida landscapes. *P. palmivora* is a soilborne fungal pathogen that survives as mycelium, chlamydospores, or, if both sexual compatibility types are present, as oospores in infested plant residues in soil. The fungus may also survive under some conditions in soil as naked chlamydospores or, more rarely, as oospores. Infection is thought to be initiated primarily from zoospores or germ tubes produced by chlamydospores in soil. Zoospores produced under flooded conditions may be particularly effective in the infection of roots or crowns of maple trees. Basal cankers may result from progressive root infections.

In repeated greenhouse tests, the roots of all 4-month-old red maple seedlings grown in raw or microwaved soil infested with as few as five chlamydospores of *P. palmivora* per gram of soil were infected by the fungus (Mitchell, *unpublished).* Black lesions were evident on tap roots and secondary roots were rotted or reduced. The stems of 70-80% of these plants had black lesions at the crown which extended 1-9 cm above the soil line. These lesions, however, appeared to be compartmentalized and seedling mortality rates were generally less than 10%. In another test, 1-year-old plants potted and grown in a greenhouse for 2 years in soil infested with *P. palmivora* had infected roots, but only sporadically developed lesions and died. Wound inoculations of the stems of 1-year-old plants resulted in more than 60% of the plants apparently compartmentalizing the pathogen; significant lesions developed in less than 10% of the plants. It appears that roots are readily infected by the pathogen, but disease progression in the crown or trunk depends on unknown environmental factors or the overcoming of disease. resistance within the tree.

CONTROL: No specific recommendations for control of this disease can be proposed at this time. However, providing adequate soil drainage to facilitate aeration and prevent flooding may be critical. It is unknown whether fungicides registered for control of *Phytophthora* spp. would be efficacious on large landscape trees in Florida.

SURVEY & **DETECTION:** Look for profuse sap exudation and distinctive, dark red-brown to brown or black staining or discoloration of bark on tree bases and lower stems. Confirmation is dependent upon isolation of the pathogen from affected bark tissues.

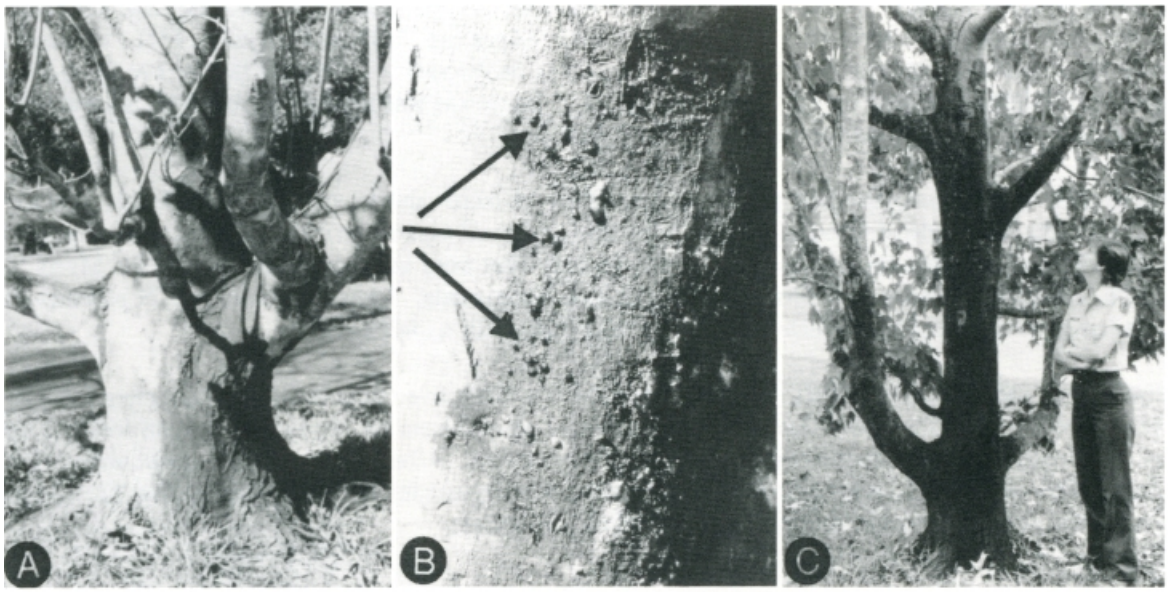

Fig. 1. Basal **canker** of red maple caused **by *Phytophthora palmivora.*** A) Dark staining and discoloration of infected bark. B) Droplets of discolored sap (arrows) exuding from infected bark tissues. C) Advanced progression of infection into tree stem and scaffold branches.

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